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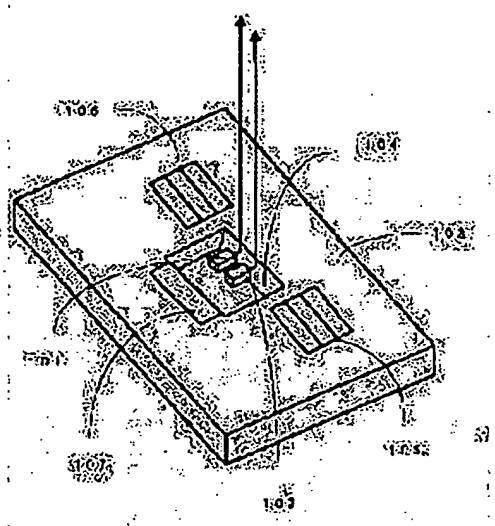
(54) COMPOSITE OPTICAL ELEMENT, OPTICAL HEAD, AND OPTICAL MEMORY DEVICE

(57)Abstract:
PROBLEM TO BE SOLVED: To obtain an optical memory device having a long life by packaging plural number of light sources to enable their beams of light to travel in an approximately parallel direction with a photodetector substrate and changing their optical paths with a reflecting mirror.
SOLUTION: A semiconductor laser 101 having emitting light wavelength 780nm, and a semiconductor laser 102 having emitting light wavelength 650nm are package on a photodiode substrate 103. This substrate 103 is formed with the reflecting mirror 104, and the light beams emitted from the semiconductor lasers 101 and 102 are traveled approximately parallel to the substrate 103, and their optical paths are changed in an approximately vertical direction to the substrate 103 by the reflecting mirror 104. The substrate 103 is formed with plural divided photodetector parts 105 and 106, and is also formed with a monitor photodiode 107 for monitoring the light emitting amts. The diode 107 is one unit capable of monitoring individual light quantities from two light sources.



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CLAIMS

[Claim(s)]
[Claim 1] The compound light study element which are two or more light sources with which optical properties differ, a photo-detector substrate, and a compound light study element which has a reflecting mirror, and is characterized by changing an optical path perpendicularly mostly with a photo-detector substrate with the reflecting mirror which mounted two or more aforementioned light sources so that light might advance in parallel mostly with a photo-detector substrate, and installed them in the photo-detector substrate.
[Claim 2] The optical head characterized by having a compound light study element according to claim 1, an optical-path branching means, and a condensing means, condensing the light from the aforementioned compound light study element to an optical-memory medium by the condensing means, and leading the reflected light from an optical-memory medium to the photo detector in a compound light study element by the optical-path branching means.
[Claim 3] Optical-memory equipment characterized by having an optical head according to claim 2, and an optical-memory medium distinction means and a light source selection means, choosing the light source by the light source selection means, and making light emit by the distinction result of the aforementioned optical-memory medium distinction means.
[Claim 4] The compound light study element characterized by changing an optical path perpendicularly mostly with a photo-detector substrate with the reflecting mirror which luminescence wavelength is near 780nm and the compound light study element for which luminescence wavelength has two semiconductor laser near 635nm to 680nm, photo-detector substrates, and reflecting mirrors, mounted two semiconductor laser so that light might advance in parallel mostly with a photo-detector substrate, and was installed in the photo-detector substrate.
[Claim 5] The optical head characterized by having a compound light study element according to claim 4, an optical-path branching means, and a condensing means, condensing the light from the aforementioned optical element to an optical-memory medium by the condensing means, and leading the reflected light from an optical-memory medium to the photo detector in a compound light study element by the optical-path branching means.
[Claim 6] It has an optical head according to claim 5, and an optical-memory medium distinction means and a light source selection means. When the distinction result of the aforementioned optical-memory medium distinction means is the optical-memory medium of CD specification, Optical-memory equipment with which luminescence wavelength is characterized by for luminescence wavelength choosing the semiconductor laser near 635nm to 680nm by the light source selection means, and making it emit light when luminescence wavelength is [the distinction result of the aforementioned optical-memory medium distinction means] the optical-memory medium of DVD specification about the semiconductor laser near 780nm.
[Claim 7] Two or more light sources A photo-detector substrate and a reflecting mirror It has the compound light study element equipped with the above, an optical-path branching means, and a condensing means, an optical-path branching means is a hologram and it is the optical head characterized by to have the light sensing portion of the abbreviation rectangle which has a long side in the direction which was able to be located in a line in two or more light sources, two or more aforementioned light sources mount so that light may advance in parallel mostly with a photo-detector substrate, and it is characterized by to change an optical path perpendicularly mostly with a photo-detector substrate with the reflecting mirror which installed in the photo-detector
[Claim 8] It is the optical head which are two or more light sources, a photo-detector substrate, and the compound light study element that has a reflecting mirror, mounts two or more aforementioned light sources so that light may advance in parallel mostly with a photo-detector substrate, has the compound light study element characterized by to change an optical path perpendicularly mostly with a photo-detector substrate with the reflecting mirror installed in the photo-detector substrate, an optical-path branching means, and a condensing means, and is characterized by for a reflecting mirror and an optical-path branching means to be the same prism.
[Claim 9] Two or more light sources with an almost equal optical property A photo-detector substrate and a reflecting mirror Have the compound light study element equipped with the above, an optical-path branching means, and a condensing means, and the light from the aforementioned compound light study element is condensed to an optical-memory medium by the condensing means. It is the optical head characterized by leading the reflected light from an optical-memory medium to the photo detector in a compound light study element by the optical-path branching means. It is characterized by changing an optical path perpendicularly mostly with a photo-detector substrate with the reflecting mirror which mounted two or more aforementioned light sources so that light might advance in parallel mostly with a photo-detector substrate, and installed them

in the photo-detector substrate.

[Claim 10] Two or more light sources The quantity of light surveillance means which consists of one light sensing portion which supervises the quantity of light of two or more light sources, a photo-detector substrate, and a reflecting mirror Have the compound light study element equipped with the above, an optical-path branching means, and a condensing means, and the light from the aforementioned compound light study element is condensed to an optical-memory medium by the condensing means. It is the optical head characterized by leading the reflected light from an optical-memory medium to the photo detector in a compound light study element by the optical-path branching means. It is characterized by changing an optical path perpendicularly mostly with a photo-detector substrate with the reflecting mirror which mounted two or more aforementioned light sources so that light might advance in parallel mostly with a photo-detector substrate, and installed them in the photo-detector substrate.

[Claim 11] Two or more light sources The quantity of light surveillance means which consists of a light sensing portion of the same number as the number of the light sources which supervise the quantity of light of two or more light sources, a photo-detector substrate, and a reflecting mirror Have the compound light study element equipped with the above, an optical-path branching means, and a condensing means, and the light from the aforementioned compound light study element is condensed to an optical-memory medium by the condensing means. It is the optical head characterized by leading the reflected light from an optical-memory medium to the photo detector in a compound light study element by the optical-path branching means. It is characterized by changing an optical path perpendicularly mostly with a photo-detector substrate with the reflecting mirror which mounted two or more aforementioned light sources so that light might advance in parallel mostly with a photo-detector substrate, and installed them in the photo-detector substrate.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] It is related with the compound light study element, the optical head, and optical-memory equipment which are used in case record or reproduction is performed to optical recording media, such as this invention, DVD (disk used for a digital video etc.), and CD (compact disk).
[0002]
[Description of the Prior Art] To the optical disk which is marketed now and is, informational record or informational reproduction is performed using the near-infrared laser beam whose wavelength is 780nm, for example in CD. Moreover, performing informational record or informational reproduction using the red laser beam whose wavelength is 680nm, 650nm, or 635nm in DVD which is one of the optical disks of high recording density from CD is examined.
[0003] With DVD equipment, since the medium of CD specification is also usable, preparing a red laser light source and the optical system corresponding to the medium substrate thickness of 1.2mm is examined.
[0004]
[Problem(s) to be Solved by the Invention] However, the CD-R medium which can be written in only once which is one of the CD specification has only a low reflection factor to a red laser beam, and cannot read data. Moreover, when data reproduction is tried by force, there is a possibility of absorbing the energy of a red laser beam, generating heat, and destroying data.
[0005] Moreover, the appearance of the optical-memory medium for various kinds of records, the optical-memory medium future further for blue laser, etc. is expected, and the compound light study element, the optical head, and optical-memory equipment corresponding to various optical-memory media are needed.
[0006] Then, in this invention, using the optimal light source for various kinds of optical-memory media, informational record or informational reproduction is possible, and it aims at offering the compound light study element, the optical head, and optical-memory equipment which moreover suppressed elevation of small and cost as much as possible.
[0007] Moreover, the life of semiconductor laser which poses a problem with the optical head for writing etc. solves a short technical problem, and also makes it the purpose to offer the long optical-memory equipment of a life.
[0008]
[Means for Solving the Problem] For this reason, in this invention, it is two or more light sources with which optical properties differ, a photo-detector substrate, and the compound light study element which has a reflecting mirror, two or more aforementioned light sources are mounted so that light may advance in parallel mostly with a photo-detector substrate, and the compound light study element characterized by changing an optical path perpendicularly mostly with a photo-detector substrate with the reflecting mirror installed in the photo-detector substrate is used. That is, it has two or more light sources which have optical properties, such as wavelength suitable for various kinds of optical-memory media, the quantity of light, and luminescence mode, and they are further miniaturized as a compound light study element using a photo-detector substrate and a reflecting mirror.
[0009] It has this compound light study element, an optical-path branching means, and a condensing means, and the light from the aforementioned optical element is condensed to an optical-memory medium by the condensing means, it corresponds to various optical-memory media the optimal in a size equivalent to the former by leading the reflected light from an optical-memory medium to the photo detector in a compound light study element by the optical-path branching means, and, moreover, the optical head which can be made very as few [cost rises] as the chip part grade of the light source is realized
[0010] It has this optical head, and an optical-memory medium distinction means and a light source selection means, and the optical-memory equipment in which informational record or informational reproduction is possible is realized using the optimal light source for various optical-memory media by choosing the light source by the light source selection means, and making light emit by the distinction result of the aforementioned optical-memory medium distinction means.
[0011] Moreover, it is characterized by changing an optical path perpendicularly mostly with a photo-detector substrate with the reflecting mirror which mounted so that it might be the compound light study element in which, as for the compound light study element of this invention, near [780nm] and luminescence wavelength has [luminescence wavelength] two semiconductor laser near 635nm to 680nm, photo-detector substrates, and reflecting mirrors and light might advance two semiconductor laser in parallel mostly with a photo-detector substrate, and was installed in the photo-detector substrate.
[0012] Moreover, the optical head of this invention has the above-mentioned compound light study element, an optical-path branching means, and a condensing means, and condenses the light from the aforementioned optical element to an

optical-memory medium by the condensing means, and it is characterized by leading the reflected light from an optical-memory medium to the photo detector in a compound light study element by the optical-path branching means.
[0013] Moreover, the optical-memory equipment of this invention has the above-mentioned optical head, and an optical-memory medium distinction means and a light source selection means. When the distinction result of the aforementioned optical-memory medium distinction means is the optical-memory medium of CD specification, When luminescence wavelength is [the distinction result of the aforementioned optical-memory medium distinction means] the optical-memory medium of DVD specification about the semiconductor laser near 780nm, luminescence wavelength is characterized by for luminescence wavelength choosing the semiconductor laser near 635nm to 680nm by the light source selection means, and making it emit light.
[0014] Moreover, an optical-path branching means is a hologram and the optical head of this invention is characterized by having the light sensing portion of the abbreviation rectangle which has a long side in the direction which was able to be located in a line in two or more light sources. If it does in this way, it will become possible to receive the light from two or more light sources by the same light sensing portion, and a detection system will be made simply.
[0015] Moreover, a reflecting mirror and an optical-path branching means are the same prism, and the optical head of this invention is characterized by receiving the light from two or more light sources by the light sensing portion of respectively exclusive use. Since it becomes possible to receive the light from two or more light sources by the light sensing portion of exclusive use, respectively and a detection system can optimize, respectively if it does in this way, a performance can be improved.
[0016] Moreover, two or more light sources with an optical property almost equal [the optical head of this invention] and a photo-detector substrate, Are the compound light study element which has a reflecting mirror, and two or more aforementioned light sources are mounted so that light may advance in parallel mostly with a photo-detector substrate. The compound light study element characterized by changing an optical path perpendicularly mostly with a photo-detector substrate with the reflecting mirror installed in the photo-detector substrate, It has an optical-path branching means and a condensing means, the light from the aforementioned optical element is condensed to an optical-memory medium by the condensing means, and it is characterized by leading the reflected light from an optical-memory medium to the photo detector in a compound light study element by the optical-path branching means. If this composition is used, even if the one light source breaks down, the life of a product can be sharply developed by changing to other light sources.
[0017] Moreover, simplification of the surveillance of the quantity of light is realized by using the quantity of light surveillance means which consists of one light sensing portion.
[0018] Moreover, even when the light source is simultaneously turned on by using the quantity of light surveillance means which consists of a light sensing portion of the same number as the number of the light sources, control of the quantity of light is enabled.
[0019]
[Embodiments of the Invention]
[Gestalt 1 of operation] With reference to a drawing, the gestalt of operation of this invention is shown below, and it explains to a pan per this invention. The example of composition of the compound light study element which starts this invention at drawing 1 is shown.
[0020] The semiconductor laser 101 with a luminescence wavelength of 780nm and the semiconductor laser 102 with a luminescence wavelength of 650nm are mounted on the photodiode substrate 103. The reflecting mirror 104 is created by the photodiode substrate 103, the light which carried out outgoing radiation from semiconductor laser 101 and 102 advances mostly to the photodiode substrate 103 at parallel, and an optical path is mostly changed perpendicularly with the photodiode substrate 103 with a reflecting mirror 104.
[0021] The light sensing portions 105 and 106 divided into plurality are formed in the photodiode substrate 103. Moreover, the monitor photodiode 107 for supervising the outgoing radiation quantity of light is formed. This monitor photodiode 107 supervises the quantity of light from the two light sources by one.
[0022] As shown in drawing 2 , the parts 201 constituted like drawing 1 are mounted in a flat package 202, it closes with the covering 203 created by transparent matter, such as glass and optical plastics, and the compound light study element of this invention is constituted.
[0023] The example of composition of the optical head of this invention is shown in drawing 3 . The compound light study element 301 of this invention is used. The hologram element 302 is formed in covering as an optical-path branching means. It condenses to an optical-memory medium, using an objective lens 303 as a condensing means. The diffraction grating 304 is formed in the objective lens, and amendment of the spherical aberration by amendment of the spherical aberration by the wavelength dispersion and the substrate thickness of an optical-memory medium and adjustment of numerical aperture are performed to the wavelength which is 780nm. That is, when using the optical-memory medium of CD specification, 780nm laser is used, and it is used with numerical aperture 0.45 using the diffracted light of the diffraction grating 304 by which aberration amendment was carried out to 1.2mm of basis board thickness. Moreover, when using the optical-memory medium of DVD specification, 650nm laser is used, and it is used with numerical aperture 0.6 using the refracted light of the objective lens 303 by which aberration amendment was carried out to 0.6mm of basis board thickness.
[0024] The example of the light-receiving pattern of a photodiode is shown in drawing 4 . A light-receiving pattern has a long configuration in the direction 401 in which the two light sources were located in a line. Thus, by arranging, even if there are a difference in the angle of diffraction by the difference in the wavelength of a hologram 302 and a difference in the position of

the light source, light can be received by the same light sensing portion.
[0025] A dashed line shows typically the light on the light sensing portion from semiconductor laser 102 for the light on the light sensing portion from semiconductor laser 101 to drawing 4 as a solid line. It may become the position with which the light shown with the dashed line and the light shown as the solid line lap with the interval of the light source etc.
[0026] As an optical-memory medium distinction means, using the way focal search operation of an objective lens detects the thickness of a medium substrate, the optical-memory equipment of the gestalt of operation of this invention is distinguished from the optical-memory medium of CD specification, when substrate thickness is 1.2mm, and when it is 0.6mm, it is distinguished from the optical-memory medium of DVD specification. When luminescence wavelength is [the distinction result of the aforementioned optical-memory medium distinction means] the optical-memory medium of DVD specification about the semiconductor laser near 780nm, luminescence wavelength chooses by the light source [semiconductor laser / whose luminescence wavelength is 650nm] selection means using CPU, and makes light emit, when the distinction result of an optical-memory medium distinction means is the optical-memory medium of CD specification.
[0027] Thereby, it corresponds to CD and both the optical-memory medium of DVD, and it becomes possible to read information safely also to a CD-R medium moreover.
[0028] [Gestalt 2 of operation] The gestalt of other operations of this invention is shown in drawing 5 .
[0029] The longitudinal mode mounts the semiconductor laser 501 which is 50mW of a single, and the 5mW semiconductor laser 502 which emits light by the multimode of self-oscillation on the heat sink 503 which has the monitor photodiode 505, and has installed this on the photodiode substrate 504 for signal detections. 2 ****s of the monitor photodiodes 505 are carried out, and they supervise the quantity of light of the two light sources independently. Simultaneous lighting is carried out by this and improvement in the speed by the parallel processing by two light is also attained. The translucent reflecting mirror 506 of an optical-path branching means and combination is installed in the photodiode substrate 504. The dielectric multilayer coat of this was carried out to the glass small prism 507, and it was created. The light sensing portions 508 and 509 of the hyperfractionation of the exclusive use which receives the signal light by each laser are formed in the photodiode substrate 504.
[0030] The light which carried out outgoing radiation from semiconductor laser 501 and 502 advances mostly to the photodiode substrate 504 at parallel, and an optical path is mostly changed perpendicularly with the photodiode substrate 504 with a reflecting mirror 506.
[0031] The example of composition of the optical head of the gestalt of this operation is shown in drawing 6 . The optical-path branching means and the reflecting mirror are constituted from small prism 507 of combination, and are condensed on an optical-memory medium with an objective lens 601.
[0032] The optical-memory equipment of the gestalt of operation of this invention distinguishes the optical-memory medium for writing, and the optical-memory medium for readouts by the optical-memory medium distinction means, and when writing in the optical-memory medium for writing and it reads a signal for 50mW semiconductor laser from an optical-memory medium, 5mW semiconductor laser is chosen by light source selection means by which CPU was used, and it makes it emit light.
[0033] thereby, sufficient record energy obtains at the time of record -- having -- the time of a readout -- a multimode luminescence sake -- ** with little noise -- sufficient S/N is securable
[0034] [Gestalt 3 of operation] The light sensing portion in the gestalt of other operations of the optical head of this invention is shown in drawing 7 .
[0035] The whole composition is the same as that of the gestalt 1 of operation almost.
[0036] As an optical branching means, light is branched to light sensing portions 701, 702, 703, and 704 using the blaze hologram divided into at least four fields. By calculating using the output of these four light sensing portions, a focal error signal, the truck error signal by the phase contrast detecting method, and a data signal are obtained. You may create a light sensing portion further around four light sensing portions.
[0037] A light sensing portion is installed in both the sides of semiconductor laser 101 and 102, and it has a long abbreviation rectangle in the direction of a line to which the virtual images 705 and 706 by the reflecting mirror 104 of each light source were connected.
[0038] Both the length of a rectangular long side is set up sufficiently long so that the light beams 707 and 708 from which light source can also be received. When it focuses on an optical-memory medium, as for the width of face of a shorter side, it is desirable to set up so that narrowly, and to make it whether it is equivalent to the width of face of the light beams 707 and 708 on each light sensing portion and some there be nothing [a thing] of the quantity of light more than a half carries out incidence to four light sensing portions at least, and a neutral zone arises in a focal error signal.
[0039] [Gestalt 4 of operation] The gestalt of other operations of the compound light study element of this invention is shown in drawing 8 .
[0040] Although the whole composition is the same as that of the gestalt 1 of operation almost, it is the example which added the light source 801 with a luminescence wavelength of 430nm, and carried the three light sources.
[0041] 802 is a photodiode for front monitors for supervising the quantity of light by the reflected light from covering. This photodiode for front monitors is used [three light source]. A light control with exact front monitors is possible.
[0042] Even in this case, it hardly changes, but can realize small and the correspondence of the whole size to much more optical-memory media is attained.
[0043] [Gestalt 5 of operation] The gestalt of other operations of the optical head of this invention is shown.

[0044] 650nm two semiconductor laser of 30 mW is carried in the compound light study element. Record reproduction is performed using one of the two's laser, and when this laser has deteriorated, it is used, changing to the laser of another side. Or it is used by turns. The life of a product can be doubled [about] by doing in this way.
[0045] In addition, the gestalt of operation shown above is an example, and various kinds of application designs are possible for it, and, naturally it is included by this invention. For example, the lens of two exclusive use may be changed and used for an objective lens besides an object with a diffraction grating. Moreover, besides the phase contrast detecting method, the tracking method of detection adds the push pull method and a diffraction grating, and also has the sample servo method possible using the 3 beam method or a wobble pit.
[0046] Moreover, not only the application to optical-memory equipment but the thing to apply to optical instruments, such as a color sensor using wavelength different, for example, is possible for the compound light study element of this invention.
[0047]
[Effect of the Invention] As explained above, in this invention, the optimal light source for various kinds of optical-memory media can be used, and optical-memory equipment [that it is compact and low cost moreover] can be realized.
[0048] Near 780nm and luminescence wavelength Two semiconductor laser near 635nm to 680nm, [especially luminescence wavelength] Are a photo-detector substrate and the compound light study element which has a reflecting mirror, and two semiconductor laser is mounted so that light may advance in parallel mostly with a photo-detector substrate. The compound light study element characterized by changing an optical path perpendicularly mostly with a photo-detector substrate with the reflecting mirror installed in the photo-detector substrate, Have an optical-path branching means and a condensing means, and the light from the aforementioned optical element is condensed to an optical-memory medium by the condensing means. It is with the optical head characterized by leading the reflected light from an optical-memory medium to the photo detector in a compound light study element by the optical-path branching means. When it has an optical-memory medium distinction means and a light source selection means and the distinction result of the aforementioned optical-memory medium distinction means is the optical-memory medium of CD specification, When luminescence wavelength is [the distinction result of the aforementioned optical-memory medium distinction means] the optical-memory medium of DVD specification about the semiconductor laser near 780nm, when luminescence wavelength chooses the semiconductor laser near 635nm to 680nm by the light source selection means and makes it emit light, luminescence wavelength CD, It corresponds to both the optical-memory medium of DVD, and it becomes possible to read information safely also to a CD-R medium moreover.
[0049] By using two or more light sources with which the output quantity of light furthermore differs from luminescence mode, the state optimal at the time of a readout is realizable at the time of writing.
[0050] Moreover, a hologram is used for an optical-path branching means, and by receiving the light from two or more light sources by the same light sensing portion using the light sensing portion of the abbreviation rectangle which has a long side in the direction which was able to be located in a line in two or more light sources, it becomes possible to simplify the circuitry of a light sensing portion, and the cost can be miniaturized and cut down.
[0051] Moreover, a reflecting mirror and an optical-path branching means are the same prism, by receiving the light from two or more light sources by the light sensing portion of respectively exclusive use, can constitute the detection system of the optimal exclusive use to each light source, and can improve a performance.
[0052] A life cycle can be lengthened by using two or more light sources of the still more nearly same property.
[0053] Moreover, by using the quantity of light surveillance means which consists of one light sensing portion, even when there are many light sources, surveillance of the quantity of light is made simply.
[0054] Moreover, even when the light source is simultaneously turned on by using the quantity of light surveillance means which consists of a light sensing portion of the same number as the number of the light sources, control of the quantity of light is attained, parallel processing by much light sources can be performed, and the readout or writing of data is attained at high speed.
[0055]

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TECHNICAL FIELD

[The technical field to which invention belongs] It is related with the compound light study element, the optical head, and optical-memory equipment which are used in case record or reproduction is performed to optical recording media, such as this invention, DVD (disk used for a digital video etc.), and CD (compact disk).

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PRIOR ART

[Description of the Prior Art] To the optical disk which is marketed now and is, informational record or informational reproduction is performed using the near-infrared laser beam whose wavelength is 780nm, for example in CD. Moreover, performing informational record or informational reproduction using the red laser beam whose wavelength is 680nm, 650nm, or 635nm in DVD which is one of the optical disks of high recording density from CD is examined.
[0003] With DVD equipment, since the medium of CD specification is also usable, preparing a red laser light source and the optical system corresponding to the medium substrate thickness of 1.2mm is examined.

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EFFECT OF THE INVENTION

[Effect of the Invention] As explained above, in this invention, the optimal light source for various kinds of optical-memory media can be used, and optical-memory equipment [that it is compact and low cost moreover] can be realized.
[0048] Especially for luminescence wavelength, luminescence wavelength is [near 780nm and] two semiconductor laser near 635nm to 680nm. Are a photo-detector substrate and the compound light study element which has a reflecting mirror, and two semiconductor laser is mounted so that light may advance in parallel mostly with a photo-detector substrate. The compound light study element characterized by changing an optical path perpendicularly mostly with a photo-detector substrate with the reflecting mirror installed in the photo-detector substrate, Have an optical-path branching means and a condensing means, and the light from the aforementioned optical element is condensed to an optical-memory medium by the condensing means. It is with the optical head characterized by leading the reflected light from an optical-memory medium to the photo detector in a compound light study element by the optical-path branching means. When it has an optical-memory medium distinction means and a light source selection means and the distinction result of the aforementioned optical-memory medium distinction means is the optical-memory medium of CD specification, When luminescence wavelength is [the distinction result of the aforementioned optical-memory medium distinction means] the optical-memory medium of DVD specification about the semiconductor laser near 780nm, when luminescence wavelength chooses the semiconductor laser near 635nm to 680nm by the light source selection means and makes it emit light, luminescence wavelength CD, It corresponds to both the optical-memory medium of DVD, and it becomes possible to read information safely also to a CD-R medium moreover.
[0049] By using two or more light sources with which the output quantity of light furthermore differs from luminescence mode, the state optimal at the time of a readout is realizable at the time of writing.
[0050] Moreover, a hologram is used for an optical-path branching means, and by receiving the light from two or more light sources by the same light sensing portion using the light sensing portion of the abbreviation rectangle which has a long side in the direction which was able to be located in a line in two or more light sources, it becomes possible to simplify the circuitry of a light sensing portion, and the cost can be miniaturized and cut down.
[0051] Moreover, a reflecting mirror and an optical-path branching means are the same prism, by receiving the light from two or more light sources by the light sensing portion of respectively exclusive use, can constitute the detection system of the optimal exclusive use to each light source, and can improve a performance.
[0052] A life cycle can be lengthened by using two or more light sources of the still more nearly same property.
[0053] Moreover, by using the quantity of light surveillance means which consists of one light sensing portion, even when there are many light sources, surveillance of the quantity of light is made simply.
[0054] Moreover, even when the light source is simultaneously turned on by using the quantity of light surveillance means which consists of a light sensing portion of the same number as the number of the light sources, control of the quantity of light is attained, parallel processing by much light sources can be performed, and the readout or writing of data is attained at high speed.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, the CD-R medium which can be written in only once which is one of the CD specification has only a low reflection factor to a red laser beam, and cannot read data. Moreover, when data reproduction is tried by force, there is a possibility of absorbing the energy of a red laser beam, generating heat, and destroying data.
[0005] Moreover, the appearance of the optical-memory medium for various kinds of records, the optical-memory medium future further for blue laser, etc. is expected, and the compound light study element, the optical head, and optical-memory equipment corresponding to various optical-memory media are needed.
[0006] Then, in this invention, using the optimal light source for various kinds of optical-memory media, informational record or informational reproduction is possible, and it aims at offering the compound light study element, the optical head, and optical-memory equipment which moreover suppressed the rise of small and cost as much as possible.
[0007] Moreover, the life of semiconductor laser which poses a problem with the optical head for writing etc. solves a short technical problem, and also makes it the purpose to offer the long optical-memory equipment of a life.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

MEANS

[Means for Solving the Problem] For this reason, in this invention, it is two or more light sources with which optical properties differ, a photo-detector substrate, and the compound light study element which has a reflecting mirror, two or more aforementioned light sources are mounted so that light may advance in parallel mostly with a photo-detector substrate, and the compound light study element characterized by changing an optical path perpendicularly mostly with a photo-detector substrate with the reflecting mirror installed in the photo-detector substrate is used. That is, it has two or more light sources which have optical properties, such as wavelength suitable for various kinds of optical-memory media, the quantity of light, and luminescence mode, and they are further miniaturized as a compound light study element using a photo-detector substrate and a reflecting mirror.

[0009] It has this compound light study element, an optical-path branching means, and a condensing means, and the light from the aforementioned optical element is condensed to an optical-memory medium by the condensing means, it corresponds to various optical-memory media the optimal in a size equivalent to the former by leading the reflected light from an optical-memory medium to the photo detector in a compound light study element by the optical-path branching means, and, moreover, the optical head which can be made very as few [cost rises] as the chip part grade of the light source is realized

[0010] It has this optical head, and an optical-memory medium distinction means and a light source selection means, and the optical-memory equipment in which informational record or informational reproduction is possible is realized using the optimal light source for various optical-memory media by choosing the light source by the light source selection means, and making light emit by the distinction result of the aforementioned optical-memory medium distinction means.

[0011] Moreover, it is characterized by changing an optical path perpendicularly mostly with a photo-detector substrate with the reflecting mirror which mounted so that it might be the compound light study element in which, as for the compound light study element of this invention, near [780nm] and luminescence wavelength has [luminescence wavelength] two semiconductor laser near 635nm to 680nm, photo-detector substrates, and reflecting mirrors and light might advance two semiconductor laser in parallel mostly with a photo-detector substrate, and was installed in the photo-detector substrate.

[0012] Moreover, the optical head of this invention has the above-mentioned compound light study element, an optical-path branching means, and a condensing means, and condenses the light from the aforementioned optical element to an optical-memory medium by the condensing means, and it is characterized by leading the reflected light from an optical-memory medium to the photo detector in a compound light study element by the optical-path branching means.

[0013] Moreover, the optical-memory equipment of this invention has the above-mentioned optical head, and an optical-memory medium distinction means and a light source selection means. When the distinction result of the aforementioned optical-memory medium distinction means is the optical-memory medium of CD specification, When luminescence wavelength is [the distinction result of the aforementioned optical-memory medium distinction means] the optical-memory medium of DVD specification about the semiconductor laser near 780nm, luminescence wavelength is characterized by for luminescence wavelength choosing the semiconductor laser near 635nm to 680nm by the light source selection means, and making it emit light.

[0014] Moreover, an optical-path branching means is a hologram and the optical head of this invention is characterized by having the light sensing portion of the abbreviation rectangle which has a long side in the direction which was able to be located in a line in two or more light sources. If it does in this way, it will become possible to receive the light from two or more light sources by the same light sensing portion, and a detection system will be made simply.

[0015] Moreover, a reflecting mirror and an optical-path branching means are the same prism, and the optical head of this invention is characterized by receiving the light from two or more light sources by the light sensing portion of respectively exclusive use. Since it becomes possible to receive the light from two or more light sources by the light sensing portion of exclusive use, respectively and a detection system can optimize, respectively if it does in this way, a performance can be improved.

[0016] Moreover, two or more light sources with an optical property almost equal [the optical head of this invention] and a photo-detector substrate, Are the compound light study element which has a reflecting mirror, and two or more aforementioned light sources are mounted so that light may advance in parallel mostly with a photo-detector substrate. The compound light study element characterized by changing an optical path perpendicularly mostly with a photo-detector substrate with the reflecting mirror installed in the photo-detector substrate, It has an optical-path branching means and a condensing means, the light from the aforementioned optical element is condensed to an optical-memory medium by the condensing means, and it is characterized by leading the reflected light from an optical-memory medium to the photo detector

in a compound light study element by the optical-path branching means. If this composition is used, even if the one light source breaks down, the life of a product can be sharply developed by changing to other light sources.
[0017] Moreover, simplification of the surveillance of the quantity of light is realized by using the quantity of light surveillance means which consists of one light sensing portion.
[0018] Moreover, even when the light source is simultaneously turned on by using the quantity of light surveillance means which consists of a light sensing portion of the same number as the number of the light sources, control of the quantity of light is enabled.
[0019]
[Embodiments of the Invention]
[Gestalt 1 of operation] With reference to a drawing, the gestalt of operation of this invention is shown below, and it explains to a pan per this invention. The example of composition of the compound light study element which starts this invention at drawing 1 is shown.
[0020] The semiconductor laser 101 with a luminescence wavelength of 780nm and the semiconductor laser 102 with a luminescence wavelength of 650nm are mounted on the photodiode substrate 103. The reflecting mirror 104 is created by the photodiode substrate 103, the light which carried out outgoing radiation from semiconductor laser 101 and 102 advances mostly to the photodiode substrate 103 at parallel, and an optical path is mostly changed perpendicularly with the photodiode substrate 103 with a reflecting mirror 104.
[0021] The light sensing portions 105 and 106 divided into plurality are formed in the photodiode substrate 103. Moreover, the monitor photodiode 107 for supervising the outgoing radiation quantity of light is formed. This monitor photodiode 107 supervises the quantity of light from the two light sources by one.
[0022] As shown in drawing 2 , the parts 201 constituted like drawing 1 are mounted in a flat package 202, it closes with the covering 203 created by transparent matter, such as glass and optical plastics, and the compound light study element of this invention is constituted.
[0023] The example of composition of the optical head of this invention is shown in drawing 3 . The compound light study element 301 of this invention is used. The hologram element 302 is formed in covering as an optical-path branching means. It condenses to an optical-memory medium, using an objective lens 303 as a condensing means. The diffraction grating 304 is formed in the objective lens, and amendment of the spherical aberration by amendment of the spherical aberration by the wavelength dispersion and the substrate thickness of an optical-memory medium and adjustment of numerical aperture are performed to the wavelength which is 780nm. That is, when using the optical-memory medium of CD specification, 780nm laser is used, and it is used with numerical aperture 0.45 using the diffracted light of the diffraction grating 304 by which aberration amendment was carried out to 1.2mm of basis board thickness. Moreover, when using the optical-memory medium of DVD specification, 650nm laser is used, and it is used with numerical aperture 0.6 using the refracted light of the objective lens 303 by which aberration amendment was carried out to 0.6mm of basis board thickness.
[0024] The example of the light-receiving pattern of a photodiode is shown in drawing 4 . A light-receiving pattern has a long configuration in the direction 401 in which the two light sources were located in a line. Thus, by arranging, even if there are a difference in the angle of diffraction by the difference in the wavelength of a hologram 302 and a difference in the position of the light source, light can be received by the same light sensing portion.
[0025] A dashed line shows typically the light on the light sensing portion from semiconductor laser 102 for the light on the light sensing portion from semiconductor laser 101 to drawing 4 as a solid line. It may become the position with which the light shown with the dashed line and the light shown as the solid line lap with the interval of the light source etc.
[0026] As an optical-memory medium distinction means, using the way focal search operation of an objective lens detects the thickness of a medium substrate, the optical-memory equipment of the gestalt of operation of this invention is distinguished from the optical-memory medium of CD specification, when substrate thickness is 1.2mm, and when it is 0.6mm, it is distinguished from the optical-memory medium of DVD specification. When luminescence wavelength is [the distinction result of the aforementioned optical-memory medium distinction means] the optical-memory medium of DVD specification about the semiconductor laser near 780nm, luminescence wavelength chooses by the light source [semiconductor laser / whose luminescence wavelength is 650nm] selection means using CPU, and makes light emit, when the distinction result of an optical-memory medium distinction means is the optical-memory medium of CD specification.
[0027] Thereby, it corresponds to CD and both the optical-memory medium of DVD, and it becomes possible to read information safely also to a CD-R medium moreover.
[0028] [Gestalt 2 of operation] The gestalt of other operations of this invention is shown in drawing 5 .
[0029] The longitudinal mode mounts the semiconductor laser 501 which is 50mW of a single, and the 5mW semiconductor laser 502 which emits light by the multimode of self-oscillation on the heat sink 503 which has the monitor photodiode 505, and has installed this on the photodiode substrate 504 for signal detections. 2 ****s of the monitor photodiodes 505 are carried out, and they supervise the quantity of light of the two light sources independently. Simultaneous lighting is carried out by this and improvement in the speed by the parallel processing by two light is also attained. The translucent reflecting mirror 506 of an optical-path branching means and combination is installed in the photodiode substrate 504. The dielectric multilayer coat of this was carried out to the glass small prism 507, and it was created. The light sensing portions 508 and 509 of the hyperfractionation of the exclusive use which receives the signal light by each laser are formed in the photodiode substrate 504.
[0030] The light which carried out outgoing radiation from semiconductor laser 501 and 502 advances mostly to the

photodiode substrate 504 at parallel, and an optical path is mostly changed perpendicularly with the photodiode substrate 504 with a reflecting mirror 506.
[0031] The example of composition of the optical head of the gestalt of this operation is shown in drawing 6 . The optical-path branching means and the reflecting mirror are constituted from small prism 507 of combination, and are condensed on an optical-memory medium with an objective lens 601.
[0032] The optical-memory equipment of the gestalt of operation of this invention distinguishes the optical-memory medium for writing, and the optical-memory medium for readouts by the optical-memory medium distinction means, and when writing in the optical-memory medium for writing and it reads a signal for 50mW semiconductor laser from an optical-memory medium, 5mW semiconductor laser is chosen by light source selection means by which CPU was used, and it makes it emit light.
[0033] thereby, sufficient record energy obtains at the time of record -- having -- the time of a readout -- a multimode luminescence sake -- ** with little noise -- sufficient S/N is securable
[0034] [Gestalt 3 of operation] The light sensing portion in the gestalt of other operations of the optical head of this invention is shown in drawing 7 .
[0035] The whole composition is the same as that of the gestalt 1 of operation almost.
[0036] As an optical branching means, light is branched to light sensing portions 701, 702, 703, and 704 using the blaze hologram divided into at least four fields. By calculating using the output of these four light sensing portions, a focal error signal, the truck error signal by the phase contrast detecting method, and a data signal are obtained. You may create a light sensing portion further around four light sensing portions.
[0037] A light sensing portion is installed in both the sides of semiconductor laser 101 and 102, and it has a long abbreviation rectangle in the direction of a line to which the virtual images 705 and 706 by the reflecting mirror 104 of each light source were connected.
[0038] Both the length of a rectangular long side is set up sufficiently long so that the light beams 707 and 708 from which light source can also be received. When it focuses on an optical-memory medium, as for the width of face of a shorter side, it is desirable to set up so that narrowly, and to make it whether it is equivalent to the width of face of the light beams 707 and 708 on each light sensing portion and some there be nothing [a thing] of the quantity of light more than a half carries out incidence to four light sensing portions at least, and a neutral zone arises in a focal error signal.
[0039] [Form 4 of operation] The form of other operations of the compound light study element of this invention is shown in drawing 8 .
[0040] Although the whole composition is the same as that of the form 1 of operation almost, it is the example which added the light source 801 with a luminescence wavelength of 430nm, and carried the three light sources.
[0041] 802 is a photodiode for front monitors for supervising the quantity of light by the reflected light from covering. This photodiode for front monitors is used [three light source]. A light control with exact front monitors is possible.
[0042] Even in this case, it hardly changes, but can realize small and the correspondence of the whole size to much more optical-memory media is attained.
[0043] [Form 5 of operation] The form of other operations of the optical head of this invention is shown.
[0044] 650nm two semiconductor laser of 30 mW is carried in the compound light study element. Record reproduction is performed using one of the two's laser, and when this laser has deteriorated, it is used, changing to the laser of another side. Or it is used by turns. The life of a product can be doubled [about] by doing in this way.
[0045] In addition, the form of operation shown above is an example, and various kinds of application designs are possible for it, and, naturally it is included by this invention. For example, the lens of two exclusive use may be changed and used for an objective lens besides an object with a diffraction grating. Moreover, besides the phase contrast detecting method, the tracking method of detection adds the push pull method and a diffraction grating, and also has the sample servo method possible using the 3 beam method or a wobble pit.
[0046] Moreover, not only the application to optical-memory equipment but the thing to apply to optical instruments, such as a color sensor using wavelength different, for example, is possible for the compound light study element of this invention.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is drawing showing the outline composition of the compound light study element concerning the gestalt 1 of operation of this invention.
[Drawing 2] It is drawing showing the appearance of the compound light study element concerning the gestalt 1 of operation of this invention.
[Drawing 3] It is drawing showing the outline composition of the optical head concerning the gestalt 1 of operation of this invention.
[Drawing 4] It is the plan showing the outline composition of the compound light study element concerning the gestalt 1 of operation of this invention.
[Drawing 5] It is drawing showing the outline composition of the compound light study element concerning the gestalt 2 of other operations of this invention.
[Drawing 6] It is the side elevation showing the outline composition of the optical head concerning the gestalt 2 of other operations of this invention.
[Drawing 7] It is the plan showing the outline composition of the compound light study element concerning the gestalt 3 of operation of this invention.
[Drawing 8] It is the plan showing the outline composition of the compound light study element concerning the gestalt 4 of operation of this invention.
[Description of Notations]
101, 102, 501, 502, 801 .. Light source (semiconductor laser)
103 504 .. Photo-detector substrate (photodiode)
104 506 .. Reflecting mirror
105, 106, 508, 509, 701, 702, 703, 704 .. Light sensing portion
107, 503, 505 .. Monitor photodiode
202 .. Flat package
203 .. Covering
302 .. Hologram
303 601 .. Condensing means
507 .. Prism

[Translation done.]

* NOTICES *

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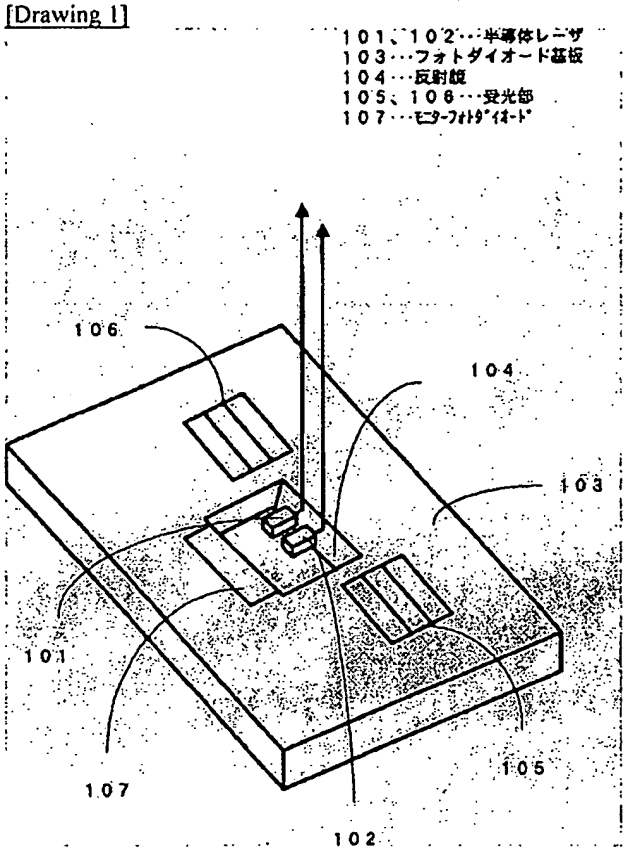
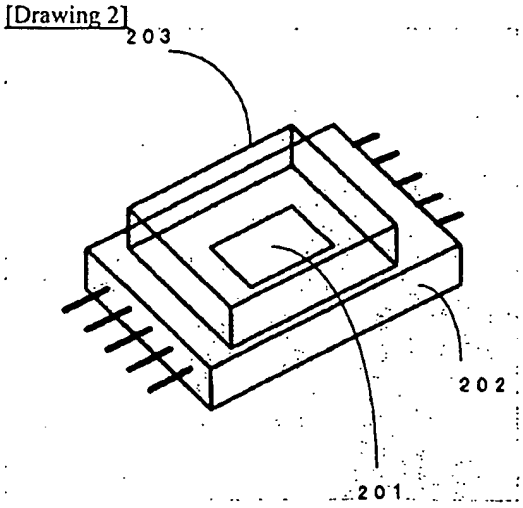
DRAWINGS

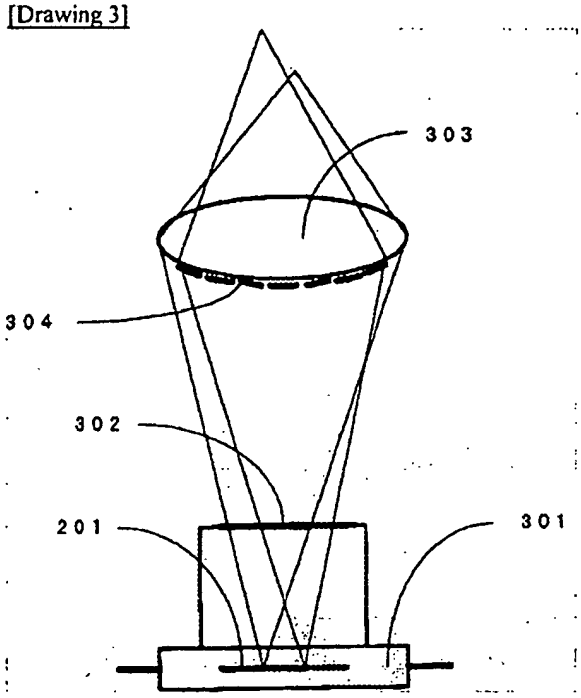
[Drawing 1]



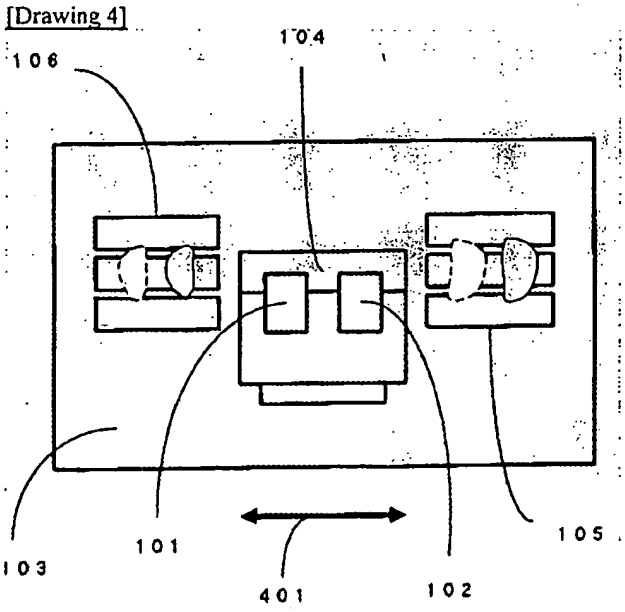
[Drawing 2]



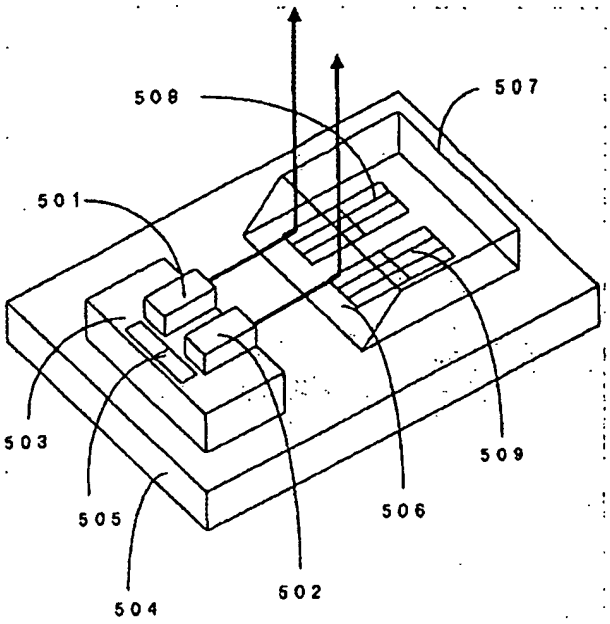
[Drawing 3]



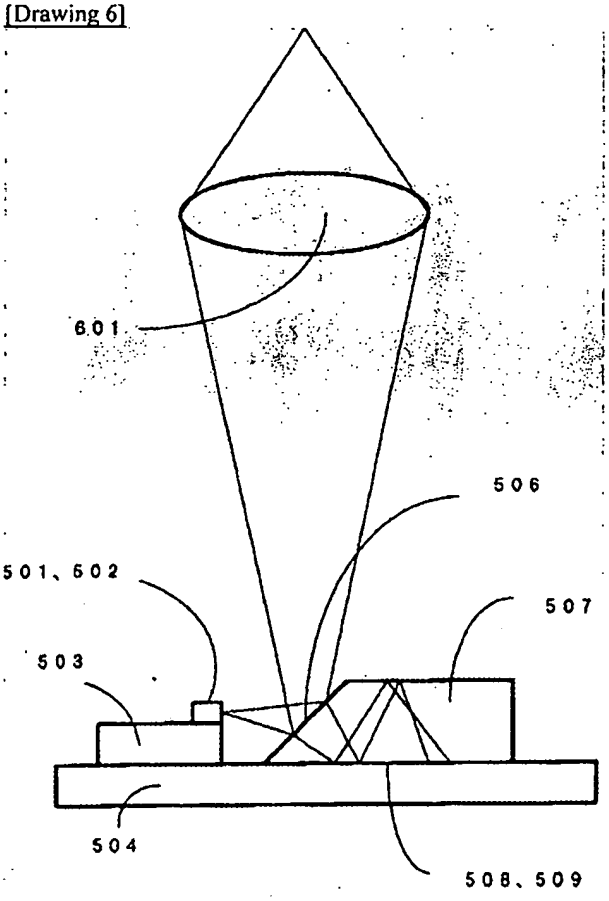
[Drawing 4]



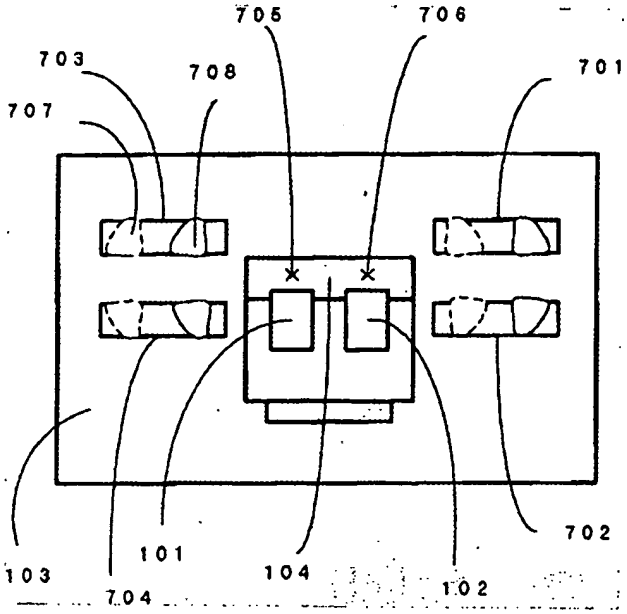
[Drawing 5]



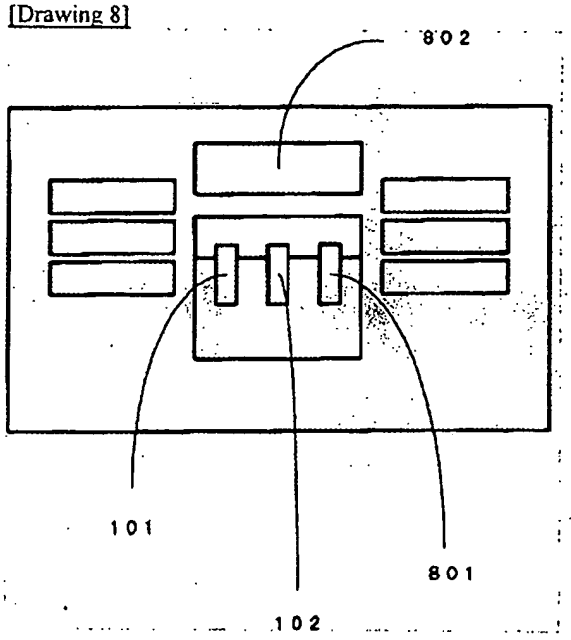
[Drawing 6]



[Drawing 7]



[Drawing 8]



[Translation done.]